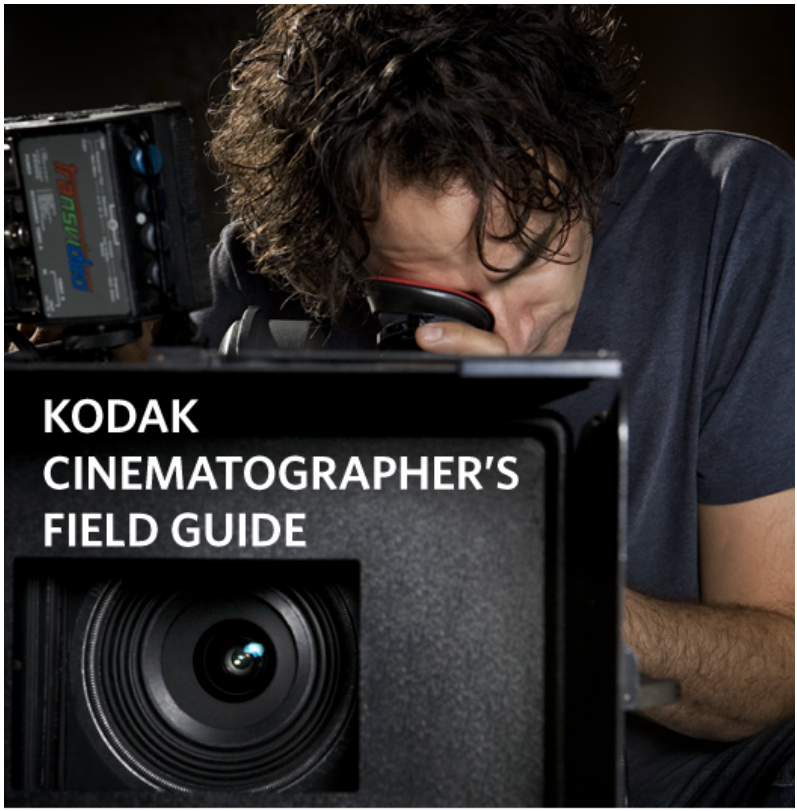

KODAK CINEMATOGRAPHER'S FIELD GUIDE

Kodak

Cinematographer's Field Guide

KODAK
MOTION
PICTURE
CAMERA
FILMS

Kodak

Cinematographer's Field Guide

Fourteenth Edition, August, 2010

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INTRODUCTION

This publication provides up-to-date and easy-to-use information about all KODAK Motion Picture Camera Films and related subjects. We designed the book to help you choose and order the right films for your needs and to help you use the films most effectively. The guide is divided into five major sections for easy reference:

- Motion Picture Camera Films
- Filter Information
- Tips and Techniques
- Formats and Packaging
- Ordering Raw Stock

Brief but comprehensive descriptions of each black-andwhite and color camera film appear in the section KODAK Motion Picture Camera Films. The Filter Information section contains charts for color conversion, neutral density, color balancing, filter factors, and color temperature. The Tips and Techniques section covers film storage and care, survival tools, flashing techniques, force processing, a filmmaker's flowchart, and more. The Formats and Packaging section clears up any questions you might have concerning spec numbers, identification numbers, film can label terms and

numbers, and packaging information. The last section, Ordering Raw Stock, tells you how to order film and find Kodak people worldwide who can answer your questions about film and film orders.

This edition includes the newest KODAK VISION3 Color Negative Films. VISION3 Films are specifically created for both traditional and digital postproduction. Offering wider latitude, two additional stops of highlight detail, and excellent tone scale and flesh-to-neutral reproduction. VISION3 Films are also engineered to maintain neutrality through the full range of exposure, allowing you more flexibility from capture to post.

An edge-numbering system for KODAK Motion Picture Camera Films features both electronic- and operator-read characters. The digital numbers, called KEYKODE Numbers, are in the form of a machine-readable barcode and a human-readable letter code. This feature provides the potential for automated film handling. All KODAK Motion Picture Color Negative and Black-and-White Camera Films have KEYKODE Numbers.

Note: The Kodak filter materials and other brand name products we describe in this

publication are available from photographic supply dealers. Equivalent materials can be used.

KODAK MOTION PICTURE CAMERA FILMS

Introduction

This section provides pertinent information about all currently available KODAK Motion Picture Camera Films.

A quick reference chart of all the films is on page 8. Page references for the individual film information sheets as they appear in this guide are included at the right of the chart. The detailed descriptions for each film begin on page 9 and include the following information:

- Film code number and film name
- Exposure indexes and filters
- General properties
- Trial exposure settings
- Illumination table and light-contrast suggestions
- Filter factors
- Reciprocity characteristics
- Handling
- Availability

CAUTION: Load and unload all camera spools in

total darkness to prevent edge fog on the film.

H-1 Data Sheets Available

Detailed data sheets for all KODAK Motion Picture Camera Films are available at the Kodak website at www.kodak.com/go/motion.

A Note on T-Stops and F/Stops

When discussing lens aperture size, cinematographers traditionally refer to T-stops while still photographers refer to f⁄stops. A T-stop is a measure of actual light transmission by the lens. An f⁄stop is the theoretical ratio of the lens' focal length to the diameter of its entrance pupil (approximately the aperture diaphragm size in a symmetrical lens). What relates the two is the lens' efficiency in transmitting light; if the lens could transmit all the light entering it, its T-stop and f⁄stop would be the same. (ANSI PH 22.90-1987, Aperture Calibration of Motion Picture Lenses, Method for Determining, gives full details.)

Color Temperature

The color quality of some light sources can be stated in color temperature; it's a measure that defines the color of a light source relative to the visual appearance and expressed in degrees Kelvin (K). There are at least two important points to consider when using color temperature values. First, color temperature refers only to the visual appearance of a light source and does not necessarily describe its photographic effect. Second, color temperature doesn't take the spectral distribution of a light source into account. Unless the light source has a continuous spectral distribution, its effective color temperature alone may not be reliable as a means of selecting a suitable correction filter. For example, fluorescent lamps do not have the continuous smooth spectral- distribution curve that is characteristic of a tungsten-filament source.

It is possible for two or more light sources to be described as having the same color temperature, even though photographic results obtained with each may be quite different. Only a wavelength-bywavelength comparison of film sensitivity and spectral output of a lamp can determine the exact filters required to balance

the light-tofilm response. KODAK Motion Picture Films have a photographic latitude that makes unusual filtration unnecessary, except for special visual effects. For most photography, filter recommendations in this publication are capable of producing excellent quality pictures with the products described.

All light sources, whether daylight, tungsten, or fluorescent, emit energy at a precise color temperature at a given moment and may not remain consistent. Some factors that affect color temperature are sun angle, conditions of sky (clouds, dust, haze), age of lamps, voltage, reflectors, etc. Deviations from the expected light source color temperature will cause an overall color shift in the finished product. While this difference may be color corrected in printing, there could be some unforeseen mired shifts. The light source color temperature should be monitored with a color temperature meter and corrected as necessary at the source, camera, or both.

Only recommended conversion filters (e.g., daylight to artificial light) that are placed on the camera are listed in this publication. Since they may not be consistent with previous recommendations, use the current recommendations for exposures and testing.

Light source filters (filters on lamps, arcs, etc.) are not listed because of the many varieties and color temperatures of the sources.

The manufacturers of these light sources should be contacted for filter recommendations. It is suggested that all filter recommendations be tested before actual shooting.

KODAK Motion Picture Camera Films

Film Name	Format			Exposure Index	KODAK WRATTEN Gelatin Filter
	35 mm	16 mm	Super 8	Daylight	Tungsten (3200 K)
COLOR NEGATIVE FILMS					
KODAK VISION3 500T 5219 / 7219	X	X	X	320	w/ 85 Filter
KODAK VISION3 250D 5207 / 7207	X	X		250	64 w/ 80A Filter
KODAK VISION3 200T 5213 / 7213	X	X	X	125	w/ 85 Filter
KODAK VISION2 Expressio 500T 5229 /	X	X		320	w/ 85 Filter

7229					
KODAK VISION2 500T 5260	X			320 w/ 85 Filter	500
KODAK VISION2 50D 5201 / 7201	X	X	X	50	12 w/ 80A Filter
COLOR REVERSAL FILM					
EASTMAN EKTACHR 100D 5285 / 7285	X	X	X	100	25 w/ 80A Filter
BLACK AND WHITE NEGATIV FILM					
EASTMAN DOUBLE-X 5222 / 7222	X	X		250	200
BLACK AND WHITE REVERSAL FILM					
KODAK		X	X	200	160

TRI-X
7266

KODAK VISION3 500T Color Negative Film 5219 / 7219

Available in 35 mm, 16 mm, and Super 8 formats
Tungsten EI 500

Exposure Indexes and Filters

Light Source	KODAK Filters on camera*	Exposure Index (DIN)
Tungsten 3000 K	None	500
Tungsten 3200 K	None	500
KINO FLO KF29	None	500
KINO FLO KF32	None	500
Daylight 5500 K	WRATTEN 2	320
	Optical Filter / 85	
Metal Halide	WRATTEN 2	320
	Optical Filter / 85	
HMI	WRATTEN 2	320
	Optical Filter / 85	
KINO FLO KF55	WRATTEN 2	320
	Optical Filter / 85	
Fluorescent Warm White**	CC30R + CC05M	320
Fluorescent Cool White**	CC40R	160

*These are approximate corrections only. Make final corrections during printing.

**These are approximate filter requirements. When the lamp type is unknown, use a KODAK WRATTEN Gelatin Filter CC30R + CC20Y with a trial exposure index of 250.

Process: ECN-2

General Properties: KODAK VISION3 500T Color Negative Film 5219/7219 is a high-speed, tungsten-balanced color negative film. The grain has been improved to give enhanced shadow detail. It delivers true, natural color over a wide range of exposures. The curve shape of this film is very linear contributing to the overall neutrality and flesh-to-neutral tone reproduction. This film also offers extended highlight exposure latitude for flexibility on set and in postproduction.

Illumination (Incident Light) Table for Tungsten Light
(24 frames per second, 180° shutter opening)

Lens Aperture	*f* / 1.4	*f* / 2	*f* / 2.8	*f* / 4	*f* / 5.6	*f* / 8	*f* / 11	*f* / 16
Footcandles	12.5	25	50	100	200	400	800	1600

Use this table for average subjects. When a subject includes only pastels, use at least 1⁄2 stop less exposure; dark colors require 1⁄2 stop more exposure.

Reciprocity Characteristics EI 500: No exposure or filter compensation is required for exposure times from 1⁄1000 to 1⁄10 second. If your exposure is in the 1-second range, increase

your exposure 2⁄3 stop and use a KODAK WRATTEN Gelatin Filter CC10R. In the 10-second range, increase exposure 1 stop and use a KODAK WRATTEN Gelatin Filter CC10R.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check the Kodak Motion Picture Product Catalog, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number.

KODAK VISION3 250D Color Negative Film 5207 / 7207

Available in 35 mm and 16 mm formats
Daylight EI 250

Exposure Indexes and Filters

Light Source	KODAK WRATTEN Filters on camera*	Exposure Index (DIN)
Daylight 5500 K	None	250
Metal Halide	None	250
HMI	None	250
KINO FLO 55	None	250
Tungsten (3000 K)	WRATTEN 2 Optical Filter / 80A	64
Tungsten (3200 K)	WRATTEN 2 Optical Filter / 80A	64
KINO FLO 29	WRATTEN 2 Optical Filter / 80A	64
KINO FLO 32	WRATTEN 2 Optical Filter / 80A	64
Fluorescent Warm White**	Color Compensating CC20M + CC05R	125
Fluorescent Cool White**	Color Compensating CC40B	100

*These are approximate corrections only. Make

final corrections during printing.

**These are approximate filter requirements. When the lamp type is unknown, use a KODAK Color Compensating Filter CC20M + CC10B with a trial exposure index of 125.

Process: ECN-2

General Properties: KODAK VISION3 250D Color Negative Film 5207/7207 incorporates the attributes of the VISION3 technology into a medium-speed, daylight-balanced emulsion. VISION3 250D Color Negative Film retains the overall look of KODAK VISION2 Films with proprietary advanced Dye Layering Technology (DLT) which provides a grain reduction in the shadow regions. VISION3 250D Film also features extended highlight latitude, in excess of two stops, enabled by the use of sub-micron imaging sensors. When the film is scanned and digitized, you will discover an increased ability to recover detail from highlight regions.

VISION3 250D Film fits seamlessly into a digital workflow. When scanning low-light scenes, VISION3 250D Film yields higher signalto- noise ratios. This is due to the under-exposure grain improvement in the red and green color records. In the under-exposure region, this translates to cleaner blacks and cleaner shadows with less noise in the shadows.

Illumination (Incident Light) Table for Tungsten Light
(24 frames per second, 180° shutter opening)

Lens Aperture	*f* / 1.4	*f* / 2	*f* / 2.8	*f* / 4	*f* / 5.6	*f* / 8	*f* / 11	*f* / 16
Footcandles	10	20	40	80	160	320	640	1240

Use this table for average subjects. When a subject includes only pastels, use at least 1⁄2 stop less exposure; dark colors require 1⁄2 stop more exposure.

Reciprocity Characteristics EI 250: No exposure or filter compensation is required for exposure times from 1⁄1000 of a second to 1 second. If your exposure is in the 10-second range, increase your exposure 1 stop and use a KODAK WRATTEN Gelatin Filter Color Compensating CC10R.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check the Kodak Motion Picture Product Catalog, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number.

KODAK VISION3 200T Color Negative Film 5213 / 7213

Available in 35 mm, 16 mm, and Super 8 formats
Tungsten EI 200

Exposure Indexes and Filters

Light Source	KODAK Filters on camera*	Exposure Index (DIN)
Tungsten 3000 K	None	200
Tungsten 3200 K	None	200
KINO FLO KF29	None	200
KINO FLO KF32	None	200
Daylight 5500 K	WRATTEN 2	125
	Optical Filter / 85	
Metal Halide	WRATTEN 2	125
	Optical Filter / 85	
HMI	WRATTEN 2	125
	Optical Filter / 85	
KINO FLO KF55	WRATTEN 2	125
	Optical Filter / 85	
Fluorescent Warm White**	CC30R + CC05M	125
Fluorescent Cool White**	CC40R	64

*These are approximate corrections only. Make final corrections during printing.

**These are approximate filter requirements. When the lamp type is unknown, use a KODAK WRATTEN Gelatin Filter CC30R + CC20Y with a trial exposure index of 100.

Process: ECN-2

General Properties: VISION3 200T is a 200-speed tungsten film that provides the image structure of a 100 speed film with the versatility of a 200 speed product — offering you the benefits of two films in one. Experience the improved extreme exposure performance and consistent VISION3 Film family look. Enjoy the added flexibility and increased creative control that comes with all the detail captured in the extremes of exposure. Benefit from the value in time and money that can be realized both on set and in postproduction.

With the addition of KODAK VISION3 200T to the VISION3 Film family, we have once again proven the value, possibilities, and power of film. It's time to look forward to the future with more options and no compromise.

Illumination (Incident Light) Table for Tungsten Light
(24 frames per second, 180° shutter opening)

Lens Aperture	*f* / 1.4	*f* / 2	*f* / 2.8	*f* / 4	*f* / 5.6	*f* / 8	*f* / 11	*f* / 16
Footcandles	12.5	25	50	100	200	400	800	1600

Use this table for average subjects. When a

subject includes only pastels, use at least 1⁄2 stop less exposure; dark colors require 1⁄2 stop more exposure.

Reciprocity Characteristics EI 200: No exposure or filter compensation is required for exposure times from 1⁄1000 of a second to 1 second.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check the Kodak Motion Picture Product Catalog, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

KODAK VISION2 Expression 500T Color Negative Film 5229/7229

Available in 35 mm and 16 mm
Tungsten EI 500

Exposure Indexes and Filters

Light Source	KODAK Filters on camera*	Exposure Index (DIN)
Tungsten 3000 K	None	500
Tungsten 3200 K	None	500
KINO FLO KF29	None	500
KINO FLO KF32	None	500
Daylight 5500 K	WRATTEN 2	320
[redacted]	Optical Filter / 85	[redacted]
Metal Halide	WRATTEN 2	320
[redacted]	Optical Filter / 85	[redacted]
HMI	WRATTEN 2	320
[redacted]	Optical Filter / 85	[redacted]
KINO FLO KF55	WRATTEN 2	320
[redacted]	Optical Filter / 85	[redacted]
Fluorescent Warm White**	CC30R + CC05M	320
[redacted]		
Fluorescent Cool White**	CC40R	160
[redacted]		

*These are approximate corrections only. Make final corrections during printing.

**These are approximate filter requirements. When the lamp type is unknown, use a KODAK WRATTEN Gelatin Filter CC30R + CC20Y with a trial exposure index of 250.

Process: ECN-2

General Properties: KODAK VISION2 Expression 500T Color Negative Film 5229/7229 is the ideal choice for the cinematographer seeking a unique look. The film offers lower contrast with excellent tone scale and flesh-to-neutral reproduction. This produces a subdued look with lower color saturation and incredibly smooth skin tones.

Illumination (Incident Light) Table for Tungsten Light

(24 frames per second, 180° shutter opening)

Lens	*f* / 1.4	*f* / 2	*f* / 2.8	*f* / 4	*f* / 5.6	*f* / 8	*f* / 11	*f* / 16
Apertu								
Footca	5	10	20	40	80	160	320	640

Use this table for average subjects. When a subject includes only pastels, use at least 1⁄2 stop less exposure; dark colors require 1⁄2 stop more exposure.

Reciprocity Characteristics EI 500: No filter corrections or exposure adjustments for exposure times from 1/1000 of a second to 1⁄10 second. In the 1-second range, increase exposure 2⁄3 stop and use a KODAK WRATTEN

Gelatin Filter CC10Y. In the 10 second range, increase exposure 1 stop and use a KODAK WRATTEN Gelatin Filter CC20Y.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check the Kodak Motion Picture Product Catalog, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

KODAK VISION3 500T Color Negative Film 5260

Available in 35 mm
Tungsten EI 500

Exposure Indexes and Filters

Light Source	KODAK Filters on camera*	Exposure Index (DIN)
Tungsten 3000 K	82B	320
Tungsten 3200 K	None	500
Tungsten	None	500
Photoflood 3400 K		
Daylight 5500 K	85	320
Metal Halide	85	320
H.M.I.		
White-Flame Arcs	85B	200
Yellow-Flame Arcs	CC20Y	320
OPTIMA 32	None	500
VITALITE	85	320
Fluorescent Cool White**	85 + CC10M	200
Fluorescent	85C + CC10R	320
Deluxe Cool White**		

*These are approximate corrections only. Make final corrections during printing.

These are approximate filter requirements. When the lamp type is unknown, use a KODAK WRATTEN Gelatin Filter CC40R with a trial exposure index of 320.

Process: ECN-2

General Properties: KODAK VISION2 500T Color Negative Film 5260 offers rich and vivid color reproduction. 5260 Film offers the highest color saturation of any Kodak color negative camera film. It is ideal for cinematographers looking to create a vivid, saturated look. In addition, it offers a tight grain structure, a sharp image, and a consistent color reproduction through a range of exposures.

Illumination (Incident Light) Table for Tungsten Light

(24 frames per second, 180° shutter opening)

Lens	*f* / 1.4	*f* / 2	*f* / 2.8	*f* / 4	*f* / 5.6	*f* / 8	*f* / 11	*f* / 16
Apertu	[redacted]							
Footca	5	10	20	40	80	160	320	640

Use this table for average subjects. When a subject includes only pastels, use at least 1⁄2 stop less exposure; dark colors require 1⁄2 stop more exposure.

Reciprocity Characteristics EI 500: No exposure or filter compensation is required for exposure times from 1⁄1000 to 1 second. In the 10-second range, increase exposure 1 stop and

use a KODAK WRATTEN Gelatin Filter CC10R.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check the Kodak Motion Picture Product Catalog, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number.

KODAK VISION3 500T Color Negative Film 5201 / 7201

Available in 35 mm, 16 mm, and 65 mm formats
Daylight EI 50

Exposure Indexes and Filters

Light Source	KODAK Filters on camera*	Exposure Index (DIN)
Daylight 5500 K	None	50
Tungsten 3000 K	80A	12
Tungsten 3200 K	80A	12
Tungsten	80A	12
Photoflood 3400 K		
White-Flame Arcs	CC20C + CC40Y	320
Yellow-Flame Arcs	CC40C	12
OPTIMA 32	80A	12
VITALITE	None	50
Fluorescent Cool White**	CC100M + CC05B	32
Fluorescent	CC10B + CC20C	32
Deluxe Cool White**		
Metal Halide	None	50
H.M.I.		

*These are approximate corrections only. Make final corrections during printing.

**These are approximate filter requirements. When the lamp type is unknown, use a KODAK WRATTEN Gelatin Filter CC20M with a trial exposure index of 32.

Process: ECN-2

General Properties: KODAK VISION2 50D Color Negative Film 5201/ 7201 is a low-speed daylight film with the world's finest grain structure. In addition, it offers sharp images, excellent tone scale and consistent flesh-to-neutral reproduction across a range of exposures.

The outstanding combination of low grain and high sharpness make it ideal for recorder output in certain situations.

Illumination (Incident Light) Table for Tungsten Light

(24 frames per second, 180° shutter opening)

Lens	*f* / 1.4	*f* / 2	*f* / 2.8	*f* / 4	*f* / 5.6	*f* / 8	*f* / 11	*f* / 16
Apertu	[redacted]							
Footca	50	100	200	400	800	1600	3200	6400

Use this table for average subjects. When a subject includes only pastels, use at least 1⁄2 stop less exposure; dark colors require 1⁄2 stop more exposure.

Lighting Contrast: The suggested ratio of key-light-plus-fill ight to fill light is 2:1 or 3:1. Use a

4:1 ratio when a special look is desired. Reciprocity Characteristics EI 50: No filter corrections or exposure adjustments for exposure times from 1⁄1000 of a second to 1 second. In the 10-second range, increase exposure 1⁄3 stop and use a KODAK Color Compensating Filter CC10R.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check the Kodak Motion Picture Product Catalog, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number.

KODAK EKTACHROME 100D Color Reversal Film 5285 / 7285

Available in 35 mm, 16 mm, and Super 8 formats
Daylight El 100

Exposure Indexes and Filters

Light Source	KODAK Filters on camera*	Exposure Index (DIN)
Daylight 5500 K	None	100
Tungsten 3000 K	80A	25
Tungsten 3200 K	80A	25
Tungsten	80A	25
Photoflood 3400 K		
White-Flame Arcs	CC20Y + CC10C	64
Yellow-Flame Arcs	CC40C	12
OPTIMA 32	80A	25
VITALITE	None	100
Fluorescent Cool White**	CC20M	80
Fluorescent	82C	64
Deluxe Cool White**		
Metal Halide	None	100
H.M.I.		

*These are approximate corrections only. Make

final corrections during printing.

**These are approximate filter requirements. When the lamp type is unknown, use a KODAK WRATTEN Gelatin Filter CC30R + CC20Y with a trial exposure index of 250.

Process: E-6, cine machine

General Properties: KODAK EKTACHROME 100D Color Reversal Film 5285 is a true 100-speed color reversal motion picture film designed for daylight. Whether you are shooting ads, music videos, documentaries, television, or features, it delivers intensely saturated color, plus a neutral gray scale and accurate skin tones. All with sharpness you won't find in any other 100-speed film.

Illumination (Incident Light) Table for Daylight

(24 frames per second, 180° shutter opening)

Lens Aperture	*f* / 1.4	*f* / 2	*f* / 2.8	*f* / 4	*f* / 5.6	*f* / 8	*f* / 11	*f* / 16
Footcandles	25	50	100	200	400	800	1600	3200

Reciprocity Characteristics EI 100: No exposure or filter compensation is required for exposure times from 1⁄1000 to 1 second.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check the Kodak Motion Picture Product Catalog, or contact a Kodak sales

representative in your country.

All rolls are identified with a product-code number and an internal productcode symbol.

EASTMAN DOUBLE-X Negative Film 5222 / 7222

Available in 35 mm and 16 mm formats
Exposure Indexes

(For development to gamma of 0.65)

Daylight	250
Tungsten	200

Process: Black and white with KODAK Developer D-96.

Force Processing: 1 stop (or more) with some loss in quality—check with your processing laboratory.

General Properties: EASTMAN DOUBLE-X Negative Film 5222/7222 is a high-speed, black-and-white camera negative film with excellent image-structure characteristics designed for general production use both outdoors and in the studio. Improvements include scratchresistant backing and a process-surviving top layer, both of which allow better camera transport characteristics; reduced noise in the camera; improved raw stock keeping; and decreased risk of ferrotyping.

Illumination (Incident Light) Table for Tungsten Light

(24 frames per second, 180° shutter opening)

Lens	*f* / 1.4	*f* / 2	*f* / 2.8	*f* / 4	*f* / 5.6	*f* / 8	*f* / 11
Apertur							
Footca	13	25	50	100	200	400	800

KODAK Filter Factors

KODAK	3	8	12	15	21	23A	25	29	96*
WRATEN Filter No.									
Daylight Filter Factor	1.5	1.5	2	3	3	5	8	20	8

*For use in bright sunlight to reduce the exposure without modifying color rendering or depth of field. This neutral-density filter in a density of 0.90 provides a reduction equivalent to 3 full stops.

Reciprocity Characteristics: No exposure or filter compensation is required for exposure times from 1⁄10,000 to 1 second.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check the Kodak Motion Picture Product Catalog, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal productcode symbol.

KODAK TRI-X Reversal Film 7266

Available in 16 mm and Super 8 formats
Exposure Indexes

(For development to a gamma of 1.0)

Daylight	200
Tungsten	160

For negative processing (gamma = 0.65) in a typical negative motion picture film developer, use the following exposure indexes:

Daylight	100
Tungsten	80

Note: Super 8 automatic cameras will expose the film at ASA 160 due to the ANSI standard cartridge notching system.

Process: This film should be processed with KODAK B&W Reversal Process Kit Chemicals or with solutions prepared according to the formulas presented in KODAK Publication No. H-24, Processing KODAK Motion Picture Films,

Note: KODAK B&W Reversal First Developer and Replenisher (D-94A) and KODAK B&W Reversal Bleach and Replenisher (R-10) should be used with this film.

General Properties: KODAK TRI-X Reversal Film 7266 A high-speed, panchromatic black-and-white film with an antihalation undercoat that makes it suitable for general interior photography with artificial light. It can also be used in daylight and is particularly useful for sports pictures taken at regular speed or slow motion in weak light (overcast sky or late in the day). This film is characterized by excellent tonal gradation and sharpness. When processed as a reversal film, the resulting positive can be used for projection or for duplication. Processed as a negative material by conventional methods, the film will yield satisfactory results, although a print will be necessary.

Illumination (Incident Light) Table for Tungsten Light

(24 frames per second, 180° shutter opening)

Lens Aperture	*f* / 1.4	*f* / 2	*f* / 2.8	*f* / 4	*f* / 5.6	*f* / 8
Footcandles	13	32	64	125	250	500

*At 18 frames per second, use 3⁄4 of the footcandles (fc) shown. When the film is used as a negative material, the values specified should be doubled.

KODAK Filter Factors

KODAK WRATTEN Filter No.	3	8	12	15	21	23A	25	29	96
Daylight Filter Factor*	1.5	2	2	2.5	3	5	10	40	8

*For use in bright sunlight to reduce the exposure without modifying color rendering or depth of field. This neutral-density filter in a density of 0.90 provides a reduction equivalent to 3 full stops.

Reciprocity Characteristics: No exposure

adjustment is required for exposure times from 1⁄1000 to 1 second.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check the Kodak Motion Picture Product Catalog, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal productcode symbol.

Incident-Light Illumination (in footcandles)

(Frame rate: 24 frames/sec - approx 1/50 sec)
Note: Data applies to both color and black-and-white films.

Exp Index	Lens Opening (Daylight or Tungsten)						
	f / 1.4	f / 2	f / 2.8	f / 4	f / 5.6	f / 8	f / 11
12	200	400	800	1600	3200	6400	13000
16	160	320	640	1250	2500	5000	10000
20	125	250	500	1000	2000	4000	8000
25	100	200	400	800	1600	3200	6400
32	80	160	320	640	1250	2500	5000
40	64	125	250	500	1000	2000	4000
50	50	100	200	400	800	1600	3200
64	40	80	160	320	640	1250	2500
80	32	64	125	250	500	1000	2000
100	25	50	100	200	400	800	1600
125	20	40	80	160	320	640	1250
160	15	32	64	125	250	500	1000
200	12	25	50	100	200	400	800
250	10	20	40	80	160	320	640
320	8	15	32	64	125	250	500
400	6	12	25	50	100	200	400
500	5	10	20	40	80	160	320

640	4	8	15	32	64	125	250
800	3	6	12	25	50	100	200
1000	*	5	10	20	40	80	160
1250	*	4	8	15	32	64	125
1600	*	3	6	12	25	50	100
2000	*	*	5	10	20	40	80

*Less than 3 footcandles

FILTER INFORMATION

Introduction

Use the filter and color temperature charts in this section as a quick reference and general guide. The values are approximate; they offer good starting points for trial exposures in critical work. For less demanding work the recommendations may be adequate, but it is always best to run tests before shooting final footage. For photography with fluorescent lights, see the individual film's filter information in the section "KODAK Motion Picture Camera Films."

Types of Filters

Optical filters may be solid, liquid, or gaseous; only solid filters are discussed in this book. These consist mainly of colorants dissolved in a gelatin or in cellulose acetate. Each KODAK Filter is standardized for spectral transmittance and total transmittance by special instruments, which apply an optical form of limit gauge to these characteristics.

The dyes are obtained from a number of sources and many have been synthesized. Like other dyes, the dyes used in filters may, in time,

change under certain conditions of heat and light. In this publication, we will address only filters for black-and-white films, color compensating, conversion, light balancing, and neutral density (No. 96).

Filters for Black-and-White Films

You can use a wide range of KODAK WRATTEN Filters with blackand- white negative films for many purposes. They vary the contrast and tonal rendering of the subject in a photograph, either to correct to the normal visual appearance or to accentuate special features. The total photographic effect obtained with a particular filter depends on four main factors: its spectral absorption characteristics; the spectral sensitivity of the sensitized material; the color of the subject to be photographed; and the spectral quality of the illuminant.

Filter Factors* for KODAK Motion Picture Films

WRATTEN Filter	Negative Films	Reversal Films	[redacted]
	PLUS-X	DOUBLE-X	PLUS-X	
No.3	1.5	1.5	1.5
No.8 (K2)	2.0	1.5	2.0
No.12 (Minus Blue)	2.5	2.0	2.0
[redacted]			
No.15 (G)	3.0	3.0	2.5
No.21	3.5	3.0	3.0
No.23A	5	5	5
No.25	8	8	10
No.29	25	20	40
No.96	8	8	8

*All filters absorb part of the incident radiation, so their use usually requires some increase in exposure over that required when no filter is used. The number of times by which an exposure must be increased for a given filter with a given material is called the filter factor, or multiplying factor.

Note: Filter factors published for KODAK Products by Kodak are intended only as approximate guides.

Published filter factors apply strictly to the particular lighting conditions used in the

laboratory where the factors were determined. For scientific applications, especially, the quality of light can vary widely so that it may be desirable to determine the filter factor for actual working conditions.

To determine a filter factor, choose a subject having a neutral-gray area, or place an 18-percent gray card or a photographic grayscale in the scene to be photographed. Make one exposure without a filter. With the filter set for the exposure, and beginning with the unfiltered exposure setting, make a series of exposures. Increase each in 1⁄2- stop increments through a 2- to 4-stop greater exposure (very dense filters may need more). After processing the negative, match densities

of the unfiltered exposure with the filter series either visually or with a densitometer. Choose the filtered exposure that is closest to the unfiltered exposure. Some additional exposure adjustments may be necessary.

Below is a conversion table of filter factors to exposure increase in stops.

Filter Factor	+ Stops	Filter Factor	+ Stops	Filter Factor	+ Stops
1.25	1⁄2	4	2	12	32⁄3
1.5	2⁄3	5	21⁄3	40	51⁄3
2	1	6	22⁄3	100	62⁄3
2.5	11⁄2	8	3	1000	10
3	12⁄3	10	31⁄3	-	-

Each time a filter factor is doubled, increase the exposure by 1 stop. For example, a filter factor of 2 requires a 1-stop exposure increase. A filter factor of 4 requires a 2- stop exposure increase. Use this example for filter factors not listed in the above table.

Color Compensating Filters

Color compensating filters control light by attenuating the red, green, or blue part of the spectrum. While controlling one color, the filter transmits one or both of the other two colors.

Thus, color compensating filters can make changes to the color balance of pictures recorded on color films, or compensate for deficiencies in the spectral quality of a light source. For optimum results, use the single recommended color compensating filter rather than combining filters (for example, CC20Y + CC20M = 20R, so using 20R only is preferable). KODAK WRATTEN Gelatin Filters / Color Compensating Filters have excellent optical quality and are suitable for image forming optical systems; such as a camera lens.

Conversion Filters for Color Films

These filters are intended for use whenever significant changes in the color temperature of the illumination are required (for example, daylight to artificial light). The filter may be positioned between the light source and other elements of the system or over the camera lens in conventional photographic recording.

Filter Color	WRATTEN Filter Number	Exposure Increase in Stops*	Conversion in Degrees
Blue	80A	2	3200 to 5500
80B	1 2/3	3400 to 5500	
80C	1	3800 to 5500	
80D	1/3	4200 to 5500	
Amber	85C	1/3	5500 to 3800
85	2/3	5500 to 3400	
85N3	1 2/3	5500 to 3400	
85N6	2 2/3	5500 to 3400	
85N9	3 2/3	5500 to 3400	
85B	2/3	5500 to 3200	

*These values are approximate. Check critical work accurately, especially if you use more than one filter.

KODAK Light Balancing Filters

Light balancing filters enable the photographer to make minor adjustments in the color quality of illumination to obtain cooler (bluer) or warmer (yellower) color rendering. KODAK Light Balancing Filters are used in scenes where light sources exhibit color temperatures that are different from those a film is balanced for. When using a color temperature meter to determine the color temperature of prevailing light, use the table below, which is for conversions of the prevailing temperature to either 3200 K or 3400 K.

Filter Color	WRATTEN Filter Number	Exposure Increase in Stops*	To Obtain 3200 K From:	To Obtain 3400 K From:
Bluish	82C + 82C	1 1/3	2490 K	2610 K
82C + 82B	1 1/3	2570 K	2700 K	
82C + 82A	1	2650 K	2780 K	
82C + 82	1	2720 K	2870 K	
82C	2/3	2800 K	2950 K	
82B	2/3	2900 K	3060 K	
82A	1/3	3000 K	3180 K	
82	1/3	3100 K	3290 K	
Yellowish	81	1/3	3300 K	3510 K
81A	1/3	3400 K	3630 K	
81B	1/3	3500 K	3740 K	
81C	1/3	3600 K	3850 K	
81D	2/3	3700 K	3970 K	

81EF	2/3	3850 K	4140 K

Neutral Density Filters

In black-and-white and color photography, filters such as the KODAK WRATTEN 2 Optical Neutral Density No. 96 Filter, reduce the intensity of light reaching the film without affecting the tonal rendition in the original scene. In motion-picture work or other photography, neutral density filters allow for the use of a large aperture to obtain differential focusing. You can use them when filming in bright sunlight or with very fast films. These filters control exposure when the smallest aperture is still too large. Also available are KODAK WRATTEN Filters with combinations of neutral density and color conversion filters (for example, No. 85N3). These filters combine the light-conversion characteristics of KODAK WRATTEN 2 Optical Filter / 85 with neutral densities.

KODAK WRATTEN 2 Optical Neutral Density No. 96 Filter

Film Package	Percent Transmittance	Filter Factor	Exposure Increase in Stops*
0.1	80	1 1⁄4	1⁄3
0.2	63	1 1⁄2	2⁄3
0.3	50	2	1
0.4	40	2 1⁄2	1 1⁄3

0.5	32	3	1 2⁄3
0.6	25	4	2
0.7	20	5	2 2⁄3
0.8	16	6	2 2⁄3
0.9	13	8	3
1.0	10	10	3 1⁄3
1.0 + 0.1	8	12	3 2⁄3
1.0 + 0.2	6	16	4
1.0 + 0.3	5	20	4 1⁄3
1.0 + 0.4	4	24	4 2⁄3
1.0 + 0.5	3	32	5

Approximate Correlated Color Temperature for Various Light Sources

Source	Degrees Kelvin
Artificial Light	
Match flame	1700
Candle flame	1850
40-watt incandescent tungsten lamp	2650
75-watt incandescent tungsten lamp	2820
100-watt incandescent tungsten lamp	2865
3200-degree Kelvin tungsten lamp	3200
Photoflood and reflector flood lamp	3400
Daylight blue photoflood lamp	4800
Xenon arc lamp	6420
Daylight	
Sunlight: sunrise or sunset	2000
Sunlight: one hour after sunrise	3500
Sunlight: early morning	4300
Sunlight: late afternoon.	4300
Average summer sunlight at noon (Washington, D.C.)	5400
Direct mid-summer sunlight	5800
Overcast sky	6000
Average summer sunlight (plus blue skylight)	6500
Light summer shade	7100

Average summer shade	8000
Summer skylight will vary from	9500 to 30,000

Note: Sunlight is the light of the sun only. Daylight is a combination of sunlight plus skylight. The values given are approximate because many factors affect color temperature. OUTDOORS: the sun angle, and the conditions of the sky—clouds, haze, dust particles—raise or lower the color temperature. INDOORS: lamp age (and blackening), voltage, type of reflectors and diffusers affect tungsten bulbs—all of these can influence the actual color temperature of the light. Usually a change of 1 volt equals 10 degrees Kelvin. But this is true only within a limited voltage range and does not always apply to "booster voltage" operation, since certain bulbs will not exceed a certain color temperature regardless of the increase in voltage.

TIPS AND TECHNIQUES

Introduction

This collection of ideas is provided by Kodak people and others who work in the professional motion picture industry.

If you have further questions about our films or their applications, please refer to the Kodak website (**www.kodak.com/go/motion**) for a list of people worldwide who can help.

Aspect Ratios

The aspect ratio is the relationship between the width and height of an image. While the image dimensions may vary in size according to projection requirements, the aspect ratio should comply with the cinematographic intent.

The industry standard for 35mm theatrical motion pictures remain a constant 1.37:1 between the introduction of sound and the introduction of Cinemascope in 1953, when "widescreen" presentations arrived. The non-anamorphic or "flat" wide-screen presentations have aspect ratios of 1.66:1, 1.75:1 and 1.85:1.

Today, the native aspect ratio for 4 Perf 35mm film is 1.37:1, but you can also extract the 1.78, 1.85, and 2.40 ratios easily. 4 Perf 35mm film remains the industry standard and is the most widely used today.

The Super 35, 4 Perf system uses the entire width of the film and is primarily used to extract an anamorphic print for theatrical release by optical reduction printing. This system is quite versatile; from a Super 35 negative, 70 mm blow-up prints can be produced, as well as extractions for 16 x 9 (1.78:1).

35mm 2 and 3 Perf formats have become an affordable 35mm film option. There is no learning curve. You use the same 35mm film stock as 4 Perf, which means no special film orders.

When comparing formats in the 2.40:1 aspect ratio, the exposed 2 Perf area is 50% the size of a traditional 4 Perf negative and 3 times larger than a Super 16 negative. The aspect ratio for 3 Perf is 1.78:1 but you can also extract 1.85:1 and 1.37:1 ratios easily. Since 3 Perf native aspect ratio is already 1.78:1, 3 Perf is perfect for TV. 3 Perf uses up to 25% less film than 4 Perf and run times are roughly 33% longer.

3 Perf is the format closest to 4 Perf in

capture area, quality and workflow. The 3 Perf capture area exposes an image between three perforations, as opposed to 4 with 4 Perf or 2 with 2 Perf. The smaller capture area decreases the amount of film needed, decreases the amount of processing needed and uses more real estate on the film,

which means less waste. These are some of the reasons 2 and 3 Perf are rapidly gaining attention in the industry. 4 Perf 35mm film remains the industry standard and is the most widely used today; although 2 and 3 Perf and Super 16mm formats are gaining popularity.

In the 1970's, filmmakers realized they could acquire extra space on a 16mm negative by removing the second set of perforations. The larger capture area meant a larger negative and higher quality image when blown-up to 35mm. Super 16 became popular in the 1990's with the advent of HDTV and is once again gaining traction with the convergence of film and digital intermediate (DI) technologies. Super 16 has an aspect ratio of 1.66:1. This is close to the HDTV format of 16:9 or the wide-screen cinema format of 1.85:1.

Force (Push) Processing

Force, or push, processing increases the effective speed and contrast of negative or reversal films by manipulating the time of development. This processing technique is usually requested to create a special effect, to increase contrast, to compensate for an error in film exposure, or because not enough light is available. While you may increase the film speed, the effect may be detrimental to visual screen quality. Pushing color film by 1 stop may have a minimal effect, but further forcing may show a noticeable increase in grain and a softening of the shadows. Similar pushing conditions for black-andwhite film will increase the grain and the contrast. Forced processing is considered one of the working tools of the motion-picture industry, but before requesting any forced processing, you should gain some familiarity with possible results through testing or discussion with laboratory personnel. However, today's faster films have decreased the need for forced processing. In any case, remember the following important ideas:

1. Find out if (and to what extent) your processing lab is prepared to offer force processing.

2. When possible, discuss your needs in advance of your assignment with a customer service representative or lab manager. A quick phone call usually gives you an answer.
3. Use the filter recommendations the lab may offer. This helps you avoid unwanted color balance shifts.
4. Be aware of the limits of the process. Decide beforehand if you can tolerate the losses in image quality that are associated with force processing your film. The best advice is usually available at the processing laboratory.

Storage and Care of Motion Picture Films

Although Kodak manufactures all KODAK Motion Picture Camera Films to very high-quality standards, you need to exercise a certain amount of care in the storage of unexposed, exposed unprocessed, and processed films. Given the care outlined in the chart on the following pages, your films and film images will last longer and will not be adversely affected by short-term extremes of temperature and humidity.

Deviations from the recommended storage conditions can initiate degradation and cause instability of the silver or dye image. Deviations also weaken the mechanical properties of the support, can delaminate the emulsion layers, and deform and distort the film. The recommended storage requirements must be maintained if quality is to be retained.

There is further information on film storage and preservation in The Book of Film Care, KODAK Publication No. H-23. This publication also discusses theatrical projection, dye stability, film handling, rejuvenation and restoration, and it includes a Film Care Checklist. You can

purchase The Book of Film Care. For ordering information see page 70. Specifications for stability of imaging media on film are outlined in detail in ANSI Standard IT9.1-1989 and ANSI Standard IT9.11-1991.

Raw Stock Relative Humidity

The quantity of moisture held by a photographic film at equilibrium is determined by US chemical properties and the relative humidity of the air.

Motion picture raw stock is packaged in taped cans. Until opened, the cans are water-vapor tight and do not require humidity-controlled storage. However, avoid storage at relative humidities of 60 percent or above. Such high humidities can damage labels and cartons (from moisture and mold), and can rust the cans. Keep raw stock in its original taped can until you are ready to use the film.

Storage Conditions

	Short Term (less than 6 months)		Long Term (more than 6 months)	
Temperatur	% Relative Humidity	Temperatur	% Relative Humidity	
Raw Stock (in original sealed cans)	13°C (55°F)	below 60	-18 to -23°C (0 to -10°F)	below 50
Exposed Unprocesse	-18 to -23°C† (0 to -10°F)‡	below 20*	Not ecommende (see text below)	
Processed B&W	21°C (70°F)	60 or lower	21°C (70°F)	20 to 30
Processed Color	21°C (70°F)	20 to 50	2°C (36°F)	20 to 30

* Keep sealed (in original cans) until temperature is above the dew point of outside air. (See table of warm-up times.)

† With possible loss of quality.

‡ Process exposed film as soon as possible after exposure.

§ For infrequent use and when maximum useful life is primary concern.

Temperature

Storage of raw stock at -18 to -23°C (0 to -10°F) reduces sensitometric deterioration but does not preserve the film indefinitely. When you remove a package of raw stock from cold storage, allow it to warm up until its temperature is above the dew point of the outside air before you open it. For film in standard packages, use the following table as a guide for warm-up times:

Film Package [redacted]	Warm-Up Time (Hours) for Sealed Packages	[redacted]
14°C (25°F) Rise	55°C (100°F) Rise	
Super 8	1	11/2
16 mm	1	11/2
35 mm	3	5

Damage from moisture condensation occurs when you remove the can from cold storage and do not allow sufficient warm-up time before you remove the seal.

Protection Against Harmful Gases and Radiation

Certain gases, such as formaldehyde, hydrogen sulfide, hydrogen peroxide, sulfur dioxide, ammonia, illuminating gas, motor exhaust, and vapors of solvents, mothballs, cleaners, turpentine, mildew or fungus preventives, and mercury can damage unprocessed and processed film. It is safest to keep film away from such contaminants.

Film and Airports

Airports use x-ray equipment to scan checked and carry-on baggage. Film can tolerate some x-ray exposure but excessive amounts result in objectionable fog (an increase in base film density and a noticeable increase in grain). The faster the film, the greater the effects of the x-rays. Not only is there danger from x-rays, but security and customs agents may open containers of unprocessed film, ruining weeks of work.

You should never check your film with your luggage. x-rays used for checked baggage are more powerful than those used for carry-on

inspection. With current security regulations your film will most likely be damaged if checked with luggage.

The traditional low dosage scanners which have been used at airports for many years to screen passengers' hand baggage are relatively safe for film up to a speed of EI200 for motion picture film or 400 speed for still film. However, the effects of radiation are cumulative and film may be screened several times as the traveler passes through various airports on a trip. Although tests have shown that 400 speed still film was not affected by up to 7 passes through a RAPISCAN machine (one of the low dosage scanners), motion picture film may be affected to a greater degree by increases in grain and fog when the film is projected on a large screen.

For this reason, it is best to avoid all x-ray scanning of motion picture film.

Unfortunately, the volume of people passing through large airports on a daily basis renders hand-inspection all but impossible, and airport personnel are less willing to accommodate your special requests. If you plan to hand-carry unprocessed film through an international airport, contact the airport security office well in advance of your flight to make arrangements. Bring a

light-tight changing bag in case it is needed. The changing bag will allow the inspectors to open the cans safely and inspect the film.

Once popular lead-lined carry bags are no longer practical—when inspectors can't see through the bags, they increase the x-ray intensity. Film, therefore, can suffer greater damage than routine inspection might have caused.

The Transportation Security Administration (TSA) recommendations for traveling with film may be found at www.tsa.gov.

The FAA provides air travelers in the United States the right to request a non-x-ray inspection of photosensitive products. For more information, see www.faa.gov. Remember that this only applies to air travelers in the United States.

Foreign Travel

Traveling internationally increases the amount of security measures at airports. Travelers should be wary of all scanners at foreign airports. You should allow for extra time at customs and security or call ahead to arrange an appointment for inspection.

It is best to plan ahead when shooting internationally. Have your film imported by an approved carrier. You can contact your nearest Kodak location to see about the best way to get

film in the country you are shooting it. Try to process the film in the country where you expose it. To find a local laboratory, contact the Kodak location nearest you.

Unprocessed Film—Before and After Exposure

Exposed film, particularly color film, deteriorates more rapidly than unexposed film. Process films as soon as possible after exposure.

Do not keep film in the camera or magazine longer than necessary. If you load magazines a long time ahead of use, protect them from excessive temperature and relative humidity until you load the camera.

Keep loaded cameras or magazines and carrying cases out of closed spaces that can trap heat from the sun or other heat sources. Closed automobiles, airplanes, or the holds of ships should not be used for storage.

Immediately after exposure, return the film to its can and retape the can to help prevent any increase in moisture content.

Processed Film Storage

The following suggestions apply to extended storage of all motion picture films. Be aware that color dyes are more prone to change than are silver images over extended periods, with heat and humidity being the chief damaging factors. Before any extended storage (ten years or more), these minimum guidelines should be followed:

- Make sure the film is adequately washed to remove residual chemicals, and that the residual hypo level does not exceed the recommended maximum. ANSI PH 4.8-1985 describes a test method for residual hypo.
- At present, only KODAK EKTACHROME Motion Picture Films require stabilization during processing for dye stability. Be sure process specifications have been strictly followed.
- All film should be as clean as possible. Cleaning is best done professionally. If you use a liquid cleaner, provide adequate ventilation. Adhere to local municipal codes in using and disposing of any solvents.
- Keep film out of an atmosphere containing chemical fumes, such as hydrogen sulfide,

hydrogen peroxide, sulfur dioxide, hydrogen sulfide, ammonia, coal gas, and automobile engine exhaust.

- Do not store processed film above the recommended 21°C (70°F), 20 to 50 percent RH for acetate or for polyester, if extended life expectancy is to be maintained. 6. Wind films with emulsions in and store flat in untaped cans under the above conditions.

Flashing Camera Films to Lower Contrast

"Flashing" means to deliberately fog film by giving it a uniform exposure before processing. The amount and type of exposure will vary with the "look" desired. This slight exposure lowers the film's contrast to some extent, primarily in the upper scale (shadow) areas, and allows for more detail in the shadows. The results are similar whether the film is pre- or post-flashed in a laboratory or on the camera (although in-camera flashing is risky and rarely, if ever, done today).

Flashing is often done to establish a closer match between films of different contrast characteristics that will be intercut. Or to create pastels from more saturated colors—enhancing shadow details that have less fill light, etc. Effects such as changing the color of shadows can be made by selective filtering (non-neutral light source).

The amount of flash will affect the result, but flashing intensity has its limits, and too much will distort the image. Flashing is often measured in percentages by cinematographers and laboratory personnel. There is no consensus

about what these percentages mean-this is usually perceived through past experience, and, as with most other creative techniques, it is important to work closely with the laboratory and gain experience through contacts and testing.

Exposed Film—What Now?

A Final Thought About Laboratories

Establish good communication with your lab. Doing so will help this step of your production go smoothly.

Know your needs—Know what you need from a lab and then discuss those needs with several labs before making a choice. Consider such things as editing, dubbing, special effects, animation, etc., so the lab can help you accomplish those tasks in the best way possible.

Get acquainted—Once you have made your choice of labs, get to know the people who will do your work. Tell them as much as you can about yourself, your needs, and your style. The more you communicate with them about yourself and your production, the better they can serve you.

Get it in writing—Face-to-face discussions and telephone calls are necessary for efficient work flow; but when it comes to specifying what you

want, when you want it, and how much it will cost, a carefully written document—the purchase order—is a must.

FORMATS AND PACKAGING

This short section is important because it provides information on the various spools and cores, sizes, windings, and packages for motion picture camera films. Specification numbers and perforation types are also explained. Also included is a detailed description of a typical film can label that will answer all your questions about film can label nomenclature. (See "How to Read a Film Can Label.")

See the complete product catalog for additional listings of formats and specifications (available at www.kodak.com/go/motion).

Specification Numbers for Camera Films

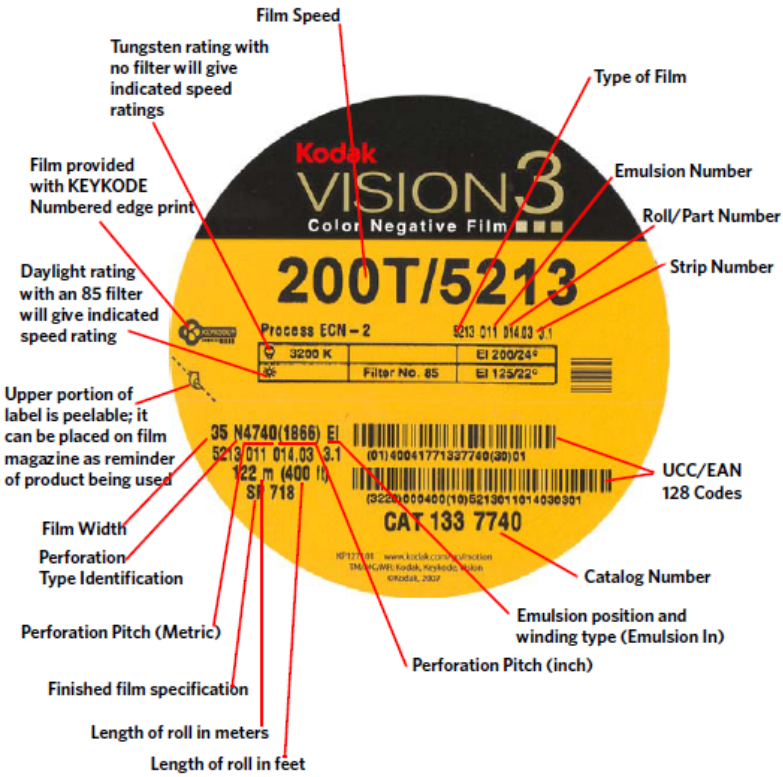
Sp No.	Film Width (mm)	Perforation	Core/ Spool/ Mag	Remarks
35 mm Films				
239	35	35 mm BH	Y	Footage numbered
417	35	35 mm BH	S-83	100-ft spool
718	35	35 mm BH	U	Footage numbered

[redacted]

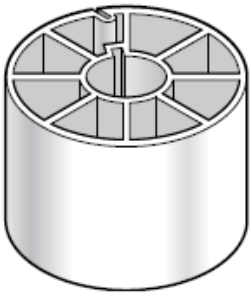
727	35	35 mm BH	U	Footage numbered
[redacted]				
65 mm and 70 mm	[redacted]			
332	65	KS1866	P	Emulsion In. Latent image sequential numbers every 120 perfs
[redacted]				
16 mm	[redacted]			
430	16	2 Edges	R-90	100-ft spool, 0.3000 pitch for high-speed cameras
[redacted]				
434	16	2 Edges	S-153	400-ft spool; 0.3000 pitch for high-speed cameras
[redacted]				
445	16	1 Edge	[redacted]	Emulsion out, for AATON A-MINIMA Camera
[redacted]				
449	16	2 Edges	R-90	100-ft spool
[redacted]				
451	16	2 Edges	T	2-in. O.D. core for
[redacted]				

[redacted]				lengths through 400 ft
455	16	1 Edge	R-90	100-ft spool, Winding B
[redacted]				
457	16	1 Edge	T	Winding B, 2-in. O.D. core for lengths through 400 ft
[redacted]				
458	16	1 Edge	Z	Winding B, 3-in. O.D. core for lengths over 400 ft
[redacted]				
578	16	2 Edges	S-153	400-ft spool
Super 8 Films	[redacted]			
464	8	Super 8-1 Edge	Super 8 Cartridge	Winding B, For Super 8 silent movie cameras
[redacted]				

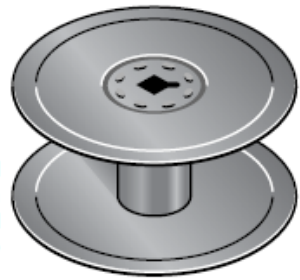
How to Read a Film Can Label



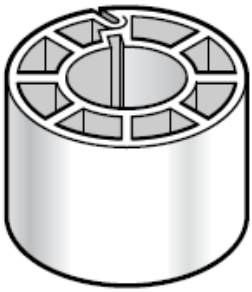
Cores and Spools Currently in Use



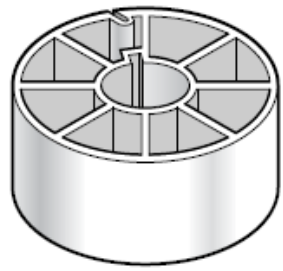
Type P Core
65 mm film
1000 ft (305 m)
and over



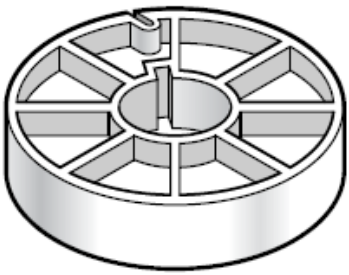
S-83 Spool
35 mm Camera
Spool
100 ft (30 m)



Type U Core
35 mm film
up to and including
1000 ft (305 m)

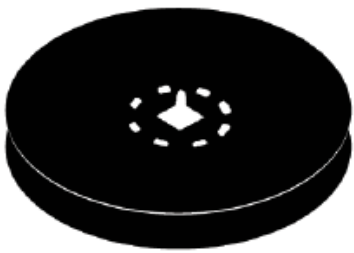


Type Y/EE Core
35 mm film
over 1000 ft
(305 m)



Type Z Core
16 mm film
over 400 ft
(122 m)

Type T Core
16 mm film
up to 400 ft
(122 m)



R-90 Spool 16 mm Camera
Spool, 100 ft (30 m)

KODAK Spool for AATON A-MINIMA
Camera 200 ft (61 m)

Perforations

Bell & Howell—"Negative" perforation used on most camera negative films. Evolved from early "round" perforations.
Kodak Standard—"Positive" perforation. Large size, rounded corners are used for extra strength. Used primarily for release prints.
16 mm—perforations are the same form (size and shape) for all film types; however, camera origination (negative or reversal) have tighter tolerances.

Cores and Spools

You can purchase KODAK Motion Picture Films on several types of cores and spools, their design depending upon the equipment in which the films are to be exposed. The standard core and spool types, shown on page 25 are described below.

Type T Core—16 mm. A plastic core with a 2-in. (51mm) outside diameter (OD). Contains a 1-in. (25.4 mm) diameter center hole with keyway and a film slot. Used with 16 mm films up to 400 ft (122 m) in length.
Type Z Core—16 mm. A plastic core with a 3-in. (76 mm) OD. Contains a 1-in. (25.4 mm)

diameter center hole with keyway and a film slot. Used with camera and print films in roll sizes longer than 400 ft (122 m) in length.

Type U Core—35 mm. A plastic core with a 2-in. (51mm) OD. Contains a 1-in. (25.4 mm) diameter center hole with keyway and a film slot. Used with camera negative, sound, print, and sound recording films, and positive films used in title cameras.

Type Y/EE Core—35 mm. A plastic core with a 3-in. (76 mm) OD. Contains a 1-in. (25.4 mm) diameter center hole with keyway and a film slot. Used with various lengths of print, intermediate, and sound recording films.

Type P Core—65 mm. A plastic core with a 3-in. (76 mm) OD. Contains a 1-in. (25.4 mm) diameter center hole with keyway and a film slot. Used with various lengths of print, intermediate, and sound recording films.

R-90 Spool—16 mm. A metal camera spool with a 3.615-in. (92 mm) flange diameter and a 1 1⁄4-in. (32 mm) core diameter. Square hole with single keyway in both flanges. Center hole configuration aligns on both flanges. For 100 ft (30 m) film loads.

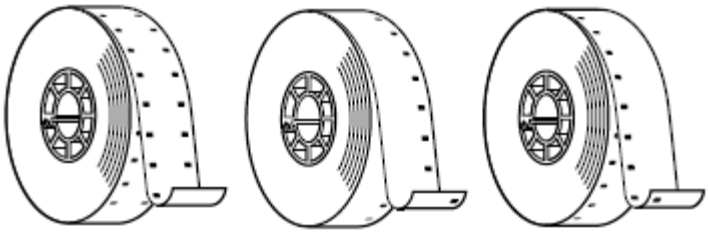
KODAK Spool for AATON A-MINIMA Camera —16 mm. Specifially designed flexible flange 200 ft (61 m) plastic daylight spool. B-wind, emulsion out. Specific to the A-MINIMA Camera consisting of 2 flexible flanges and a non-keyed 2- inch core. Can be loaded in subdued light without edge fogging.

S-83 Spool—35 mm. A metal camera spool with a 3.662-in. (93 mm) flange diameter and a 31⁄32 in. (25 mm) core diameter. Square hole with single keyway in both flanges. Center hole aligns on both flanges. For 100 ft (30 m) and 150-ft. (46 mm) film loads.

A plastic core is normally used with all 16 mm films in lengths over 200 ft (61 m) and with all 35 mm films in lengths over 100 ft (30 m). Camera spools are supplied with some 35 mm x 100-ft (30 m) rolls and 16 mm x 100-ft (30 m), 200-ft (61 m) and some 400-ft (122 m) rolls.

Winding Designations

In the sketches below, the film is wound on cores and the emulsion side of the film faces the center of the roll. All 35 mm camera films and many 16 mm camera films have perforations on both edges (2R in the sketch). All one-edge perforated 16 mm camera films are Winding B.



2R 1R — WINDING B 2R — WINDING A

Perforation Types

35 mm and 65 mm End Use

10. BH-1870-35 mm Bell & Howell negative perforations with a pitch measurement of 0.1870 in. (4.750 mm), long pitch, (ANSI/SMPTE 93-2005)
11. BH-1866-35 mm Bell & Howell negative perforations with a pitch measurement of 0.1866 in. (4.740 mm), short pitch, (ANSI/SMPTE 93-2005)
12. KS-1866-35 mm and 65 mm KODAK Standard Positive perforations with a pitch measurement of 0.1866 in. (4.740 mm), short pitch, (ANSI/SMPTE 139-2003; ANSI/SMPTE 145-2004)
13. DH-1870-35 mm Dubray-Howell perforations with a pitch measurement of 0.1870 in. (4.750 mm), long pitch, (ANSI/SMPTE 237-2003)
14. KS-1870-70 mm film perforated 65 mm KODAK Standard Positive perforations with a pitch measurement of 0.1870 in. (4.750 mm), long pitch, (ANSI/SMPTE 119- 2004)

16 mm End Use

15. 2R-2994-16 mm film perforated two edges with a perforation pitch of 0.2994 in. (7.605 mm), short pitch, (ANSI/SMPTE 109-2003)
16. 2R-3000-16 mm film perforated two edges with a perforation pitch of 0.3000 in. (7.620 mm), long pitch, (ANSI/SMPTE 109-2003)
17. 1R-2994-Same as 2R-2994 except perforated one edge (ANSI/SMPTE 109-2003)
18. 3R-2994-35 mm film perforated 16 mm with a perforation pitch of 0.2994 in. (7.605 mm), short pitch, (ANSI/SMPTE 171-2001)
19. 1R-3000-Same as 2R-3000 except perforated one edge (ANSI/SMPTE 109-2003)
20. 3R-3000-Same as 3R-2994 except with a perforation pitch of 0.3000 in. (7.620 mm), long pitch, (ANSI/SMPTE 171-2001)

Note: For other perforation types or formats, consult your Kodak Entertainment Imaging office.

Quantities—Standard Packages

For faster service and easier handling, order case-lot quantities whenever possible.

Film Width	Film Type	Roll Length	Case Quantity	Approx. Case Weight
35 mm	Camera Films (color and B/W)	100 ft (30 m)	50	35 lb (16 kg)
200 ft (61 m)	20	28 lb (13 kg)		
400 ft (122 m)	10	25 lb (11 kg)		
1000 ft (305 m)	5	30 lb (14 kg)		
16 mm	Camera Films (color and B/W)	100 ft (30 m)	50	22 lb (10 kg)
200 ft (61 m)	30	30 lb (14 kg)		
400 ft (122 m)	30	30 lb (14 kg)		
800 ft (244 m)	12	37 lb (17 kg)		

ORDERING RAW STOCK

Introduction

All of the information presented in this field guide is intended to help you determine—

- the right film (performance characteristics), in
- the right quantities (shooting time/ratio), and
- the right format (width, perforations, winding, packaging, etc.).

How to Order

In this section, we briefly explain how to write (or phone) an order so you can get the film you need to begin or continue production on schedule. After you place an order with a Kodak company or distributor in your country, they'll arrange for all the other particulars of your order, such as product availability, terms of payment, applicable taxes, transportation, and returns.

The Catalog Number (CAT No.)

This number is perhaps the most important piece of information to know when you want to buy film from Kodak. The CAT No. describes a particular kind of film, the size, length,

perforation, pitch, and other format information to Kodak representatives. For example, the CAT No. for 400 ft (122 m) of KODAK VISION3 500T Film 5219 (35 mm), BH-1866 (4740) perforation type, with a film identification number of SP718, on a core is 873 8304. That seven-digit CAT No. describes only one film package.

To receive your order as quickly as possible, give us the correct CAT No. listed in your Kodak price catalog. That seven-digit number is the key to your film order-all additional related numbers and descriptions verify the CAT No. and rule out the possibility that the number was recorded incorrectly. Once the CAT No. is written in our order sheet, we know the exact film you need, the length of one roll, the specific core or spool, the perforation pitch, the price, and a multitude of other important details.

Let's look at one example:

If you order a 400-ft (122 m) roll of 35 mm KODAK VISION 500T Color Negative Film 5219, the CAT No. is 873 8304. That number tells us exactly what you need.

To verify that number, include:

- the name of the film (5219)
- Specification No. (SP718)

- roll length (400 ft [122 m]) on core
- perforation pitch (BH-1866 [4740]).

Product and Technical Information

Throughout the world, Eastman Kodak Company provides the motion picture industry with a full range of quality products, supported by worldwide technical services and distribution. The goal is simple: to provide customers with products and services to help them achieve the best screen image possible.

The vast majority of filmmakers choose KODAK Motion Picture Films to generate quality images. Cinematographers and laboratory professionals know they can count on Eastman Kodak Company for fast, experienced technical assistance and a film-distribution network that reaches just about every corner of the globe. Our involvement extends to theaters where we assist exhibitors in providing first-class viewing environments.

For technical information visit the Entertainment Imaging website at **www.kodak.com/go/motion**. To place an order in the United States, call 1-800-621-FILM. To place an order in countries outside the U.S., contact Kodak in your country or the nearest

distributor.

Two internationally recognized sources of technical information for motion picture procedures and standards are the Society of Motion Picture and Television Engineers (SMPTE), located at 595 West Hartsdale Avenue, White Plains, New York 10607, 914-761-1100, and the American National Standards Institute (ANSI), 550 Mamaroneck Ave., Harrison, New York 10528, 212-642-4900.

The American Cinematographer Film Manual, from the American Society of Cinematographers, covers virtually every phase of motion picture photography. The seventh edition is available from A.S.C. Press, P. O. Box 2230, Hollywood, California 90078.

US Sales Office Locations

Hollywood, California
6700 Santa Monica Boulevard Tel:
323-464-6131
Los Angeles, California 90038-1203 Fax:
323-468-1568
Fax: 323-468-2124
Orders 800-621-FILM

New York, New York
360 West 31st Street Tel: 212-631-3400
New York, New York 10001-2727 Fax:
212-631-3470
Orders 800-621-FILM

KODAK SHOOTSAVER
Film Delivery Service (U.S. Only) Tel:
800-404-2016

Worldwide Sales Office Locations

A complete and up-to-date listing of Kodak offices worldwide is available at **www.kodak.com/go/salesoffices**.

Limitations of Liability on Sensitized Goods

The sale, use, processing and handling of Kodak sensitized goods are subject to the applicable limitation of liability listed below:

Film

KODAK Films will be replaced if defective in manufacture, labeling or packaging, or if damaged or lost by us or any subsidiary company. Except for such replacement, the sale, or other handling of these films is without warrant or liability, even though defect, damage, or loss is caused by negligence or other fault. Since color dyes may in time change, color films will not be replaced for, or otherwise warranted against, any change in color.

You can also find addresses and phone/fax numbers at the Kodak website: **www.kodak.com/go/motion**.

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